

Gadgets in the VFR Cockpit

Technology in the cockpit that enhances safety is to be encouraged, but there is a downside that can actually reduce safety – an unintended outcome.

While Global Positioning Systems (GPS) for navigation, and other portable electronic devices, may be used in VFR operations, there have been instances where over-reliance, sole-use, or other GPS-related issues have been identified as the main contributing factor to safety occurrences, as illustrated in the following cases.



Examples

- » A pilot unfamiliar with the local area was preoccupied with navigating using his GPS. He flew through a glider winch-launching area not knowing it was there, and had to take immediate evasive action to avoid colliding with a winch cable that was attached to a glider being launched.
- » Both pilots became distracted when one was explaining the functioning of the GPS to the other. They then allowed their aircraft to inadvertently enter controlled airspace and conflict with two aircraft flying instrument approaches.
- » After entering a control zone without a clearance, the helicopter pilot landed in a paddock to avoid any conflict with other aircraft. The pilot said he had become uncertain of his position after "losing" his GPS.
- » Without a clearance, an aircraft was seen in controlled airspace at 10,000 feet and climbed to 12,600 feet. The pilot said his GPS did not show that he was inside controlled airspace.
- » An aircraft entered controlled airspace without a clearance when the pilot, using his GPS, believed that he was well clear of any controlled airspace.

Cost reductions, and advances in computing power and sophistication, have made electronic devices like GPS affordable and popular in general aviation for navigation, including light sport and microlight aircraft. Storing and displaying flight manuals and checklists (normal and emergency), getting weather information, and flight planning, are some other examples of uses for portable electronic devices, which can include such things as electronic flight bags, iPads, e-Readers, laptops and cellphones.

Fundamental to safe flying is the maintenance of a clear mental picture of the surrounding terrain and obstacles, the airspace and its limitations or restrictions, and the location of other aircraft. A danger VFR pilots face is that they can be lured into diverting a lot of their attention to the electronic gadgets inside the cockpit, and not maintain an outside lookout. In such cases, pilots can lose situational awareness, and run the risk of inadvertently entering controlled airspace, continuing into areas of bad weather, or worse, colliding with an obstacle or another aircraft.

An unintended human factors issue with the use of electronic navigation (and other) devices under VFR, is that they can lure pilots into over-confidence and a 'head-in-the-cockpit' mentality. Visual flight means you must remain visual with at least the required minimum visibility and stay aware of the world outside the cockpit, including the airspace and terrain, irrespective of the information the devices provide.

Carlton Campbell, an A-category flight instructor and flight examiner, and the CAA Standards Development and Training Officer, says that when he was giving mountain flying instruction, he increasingly found himself having to tell students to forget the GPS and to concentrate on the exercise at hand.

"During the instructional flight, the student's attention was diverted to the GPS display, entering waypoints, and ensuring they could replicate the flight. Students missed the fundamental VFR principle of navigating from outside the aircraft, and missed the training message by being preoccupied with the GPS, and consequently confused the objectives," Carlton says.

While a GPS can significantly assist VFR pilots, it should be used only to supplement visual navigation techniques, not as a primary navigation source. Best practice is to have up-to-date paper aeronautical charts available and open, and to always use them as the primary means of navigation.

"GPS should be used only as a support resource to the primary objective of navigating by external references. Pilots must have their eyes outside the cockpit, keep ahead of the aircraft, and form a mental



An example of a moving map display and GPS on an iPhone.

An example of an iPad display.

Antennas can give poor reception, get disconnected and be subject to interference – so always have a fall-back plan.

picture of what is coming up. The GPS should be used to support this, not the other way around.

"A fundamental human factor principle says to programme or reset the GPS only during times of reduced workload, and to avoid fiddling with it at pressure points during periods of heavy workload, for example, takeoff, approach, and landing. This includes 'choke points' where the potential to encounter other aircraft activity is high," Carlton cautions.

Some Tips

Carlton has also observed that many GPS users in the VFR environment are self-taught, and are not necessarily proficient in the use of the equipment, but think they are. His advice: "Get some professional help to improve your proficiency levels."

"A popular GPS feature is the 'Direct To' function, but unlike the promulgated route structures, this can take you in a straight line to the destination without considering restricted or controlled airspace, terrain, or other obstacles. To avoid relying on this feature, pre-programme the GPS with accurate flight plan information and waypoints before the flight," Carlton says.

Paul Kearney, also an A-category flight instructor and flight examiner, reiterates that the self-taught option is a very poor way to learn how to use a GPS effectively.

"I find that pilots are prepared to spend hundreds, or even thousands, of dollars on a GPS unit, yet won't pay for a few hours with a GPS-qualified flight instructor to teach them the fundamentals, and how to safely use the units. Frequently, it's the subtle features that pilots don't discover until after they make a mistake, which often has already resulted in a problem, for example an airspace infringement.

"There are also several PC-based software courses or simulators available for most GPS units, which are excellent tools for learning how to use the units long before getting airborne. That way your eyes are outside when flying and not looking for the right button to push, or thinking 'how do I get it to do ...?'" Paul adds.

Under VFR, portable electronic devices are non-regulated, so the onus is on the pilot to ensure that their electronic equipment is properly maintained and has accurate up-to-date information. Regularly update the GPS database, and check it against current charts for any airspace changes.



Peter Oberschneider, another A-category flight instructor and flight examiner, comments that pilots need to remember that under VFR their GPS receivers do not meet the same integrity standards as the more expensive IFR equipment.

"In short, the VFR and the handheld GPS receivers can give significant erroneous readings, without warning. I have also seen the units lock up – a problem that when recognised might be too late, and you could find yourself well inside controlled airspace. I agree that the 'Direct To' function is a supplement, which unfortunately is often used as a primary navigation aid by many 'GPS junkies'," Peter cautions.

With respect to portable GPS units, Carlton cautions that, "Batteries can go flat and devices can malfunction. Antennas can give poor reception, get disconnected and be subject to interference – so always have a fall-back plan. Orientate and secure the devices, so they are readily available and readable, and cannot interfere with the flight controls.

"Remember – always plan your flight as a visual navigation flight, allowing for proper tolerances for controlled and restricted airspace. Be thoroughly conversant in the use of the equipment and be aware of any limitations – you don't want to be working this out in-flight.

"A good principle to apply is if the GPS (or other device) failed, you would not find yourself in an unsafe or unwanted situation, and your situational awareness is such that you could safely continue as planned," Carlton adds.

Further Reference

AC 43-14 *Avionics, Installations – Acceptable technical data Appendix 4, Installation of En-route GPS Equipment Approved 'For VFR Use Only'* ■